



Short Communications

Addressing Equity and Affordability in Digital Study Tools for STEM and the Health Sciences: Possibilities for Library Involvement

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Abstract

Students in STEM and the health sciences have unique learning needs, including preparation for exams required for entering a STEM or health sciences profession. Students in these areas thus often seek, in addition to or instead of traditional course materials and library resources, digital study tools that utilize techniques such as spaced repetition. However, such tools are often sold as individual subscriptions that may be prohibitively expensive. The article outlines four approaches libraries may consider to help make digital study tools in STEM and the health sciences more equitable and affordable: assess, adopt, adapt, and create.

Keywords: Self-directed learning, Digital study tools, Health sciences, STEM

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Introduction

Libraries supporting STEM and health sciences students face unique challenges when trying to address students' needs for study resources. Because of the need to prepare for high stakes exams in these disciplines, students often turn to digital study tools utilizing spaced repetition and visual learning techniques instead of or in addition to textbooks and lectures (Laynor, 2023). Students are also developing their own study tools and crowdsourcing study materials, outside the purview of instructors and librarians (Wu et al., 2021). Libraries accustomed to acquiring materials through established publishers confront a new challenge of how to engage with these proprietary study tools (O'Hanlon & Laynor, 2019). The rise of digital study tools specifically presents challenges for equity and affordability.

In STEM and health sciences, the cost of exam prep study tools may be more of an issue than textbook costs. For example, Bhatnagar et al. (2019) found that the average cost to prepare for osteopathic medicine board exams was \$4,129. Ikonne et al. (2022) have observed that the cost of "high-quality external resources, such as question banks and review videos, may be cost prohibitive to students for lower socioeconomic households" and thus "may exacerbate inequalities" (p. 1474). While many academic libraries have embraced initiatives for open education resources (OER) and textbook affordability, such initiatives do not typically address the needs of STEM and health sciences students for often expensive digital study tools.

Bharti and Leonard (2021) have noted that most OERs in STEM are for lower level undergraduate courses and lack more advanced topics at the upper undergraduate and graduate levels. Kirschner et al. (2023) have written about the lack of OER for most health sciences topics and how health sciences students have unique learning needs, such as preparing for the board exams required for entrance into health professions. Because the exam questions for health professions board exams are typically proprietary content, it is difficult to develop and maintain OER study materials for them. The lack of OER and the use of digital study tools in STEM and the health sciences creates a complicated landscape for librarians attempting to meet the needs of learners in these areas.

In this article, we present a set of approaches to balancing local user needs and library capacity and values. We outline four approaches for library involvement in addressing equity and affordability in digital study tools in STEM and the health sciences: assess, adopt, adapt, and create. One or more of these approaches may be appropriate for a specific library depending on local needs and capacities. Beginning with an assessment of local needs, a library can then determine what specific collection development, information literacy, instructional design, or OER creation initiatives to pursue for meeting their students' desire for digital study tools.

Assess

One way that librarians can identify the culture of open education and digital study tool needs at their institution is simply by asking questions. Stakeholder interviews are an effective method for listening to key figures in an academic institution in order to assess their needs around OER and digital study tools ([SPARC Open Education Leadership Program curriculum](#)). Think critically about possible stakeholder populations like students, faculty, administrators, teaching assistants, grant managers, and laboratory staff. If a librarian works with a specific college or department, it may make sense to begin with one subject area.

After a starting point is identified, make a list of possible faculty and administrators with which to speak. Look for faculty or staff who are involved in health sciences or STEM education, with titles like dean of education, dean of graduate or undergraduate programs, dean of first year, etc. Look for faculty who may already be users of the library or ones who have relationships with librarians. Students may prove harder to find. Front desk staff may be especially helpful in identifying students who are library users. If able to provide reimbursement for student time, try to recruit through library social media, student listservs, or by physical signs in the library.

The next step is to send the stakeholders a short email that defines and describes open education, as well as places the cost of course materials and digital study tools within the context of student affordability. Provide links to popular definitions and resources if appropriate. Be clear and state that the purpose of the interview is to discover how open education and the cost of study materials intersect in their work. A 30-minute interview is considerate of educators' and students' time, so be clear of that time limit in the initial email.

Questions asked at a stakeholder interview may be unique to your institution. Recommended questions for faculty or staff include ([Hazlitt, 2019](#); [Rodriguez, 2019](#)):

- Have you heard of open education or OER before my email? What do you know about this topic?
- What do you know about students' spending habits for textbooks, course materials, and supplemental digital study tools?
- What benefits and concerns do you see in using digital study tools?
- How does open education fit into the organizational mission?
- How would you encourage faculty to use OER?
- How could you subsidize digital study tools to take the responsibility away from students?

When talking with students, these questions may be relevant.

- How much do you spend on textbooks in one semester/one year?
- If you aren't spending much money, why is that? How do you get around purchasing your textbooks?

- Are there digital study tools or supplemental materials that you are spending extra money on? How much money do you spend on digital study tools? How does this cost affect other areas in your life?
- Have you ever developed your own study materials?

During the stakeholder interview, take detailed notes in a document or even record them if the interviewee consents to that. After the interview, send a follow-up email that shares any resources and thanks them again for their time. Common themes or questions may recur throughout these interviews. Reach out to these contacts to provide more information and ask them to share with their colleagues. These short interviews may be the key to building relationships around open education, digital study tools, and library involvement.

Once you have completed an institutional needs assessment, what comes next? Here are some possible approaches to take depending on your needs assessment and the capacity or priorities at your library. The approaches the authors suggest are adopting or paying for commercial self-directed study resources that students are already using, adapting curriculum to better mimic self-directed study resources or creating OER self-directed study resources.

Adopt

Libraries can choose to address health sciences and STEM student study needs by adopting already existing resources. This would mean subscribing to commercial resources, such as Osmosis, AMBOSS and Sketchy. Many students are already paying for these resources as individual subscribers ([Bhatnagar et al., 2019](#); [Finn et al., 2022](#)). These resources are increasingly offering institutional options. While this does not forward OER, it does help libraries provide more equitable access to these often-expensive resources. It extends libraries' approach of collecting test preparation materials, such as through a subscription to Board Vitals or purchasing test preparation books. Some libraries, such as Boston University and Hofstra University, subscribe to Osmosis, for example ([Boston University Alumni Library, n.d.](#); [Donald and Barbara Zucker School of Medicine, 2020](#)). There are limitations to this approach. There may not be money available to subscribe to additional resources. Tackling the need for digital study tools as traditional collections brings with it all the issues of library collection development, such as the potential for exorbitant price increases. Also, students do tend to want multiple resources and the popularity of different resources waxes and wanes from year to year ([Laynor & Tagge, 2019](#)). While many academic libraries have patron driven acquisitions (PDA) and do make subscription decisions based on usage and user interest, library collection policies and processes do not lend themselves to changing the study resource(s) subscribed to from year to year.

Adapt

Libraries can choose to pursue or suggest opportunities to adapt curriculum to help bring in more elements from digital study tools. For example, students and faculty have collaborated to create Anki flashcards, chosen purposely as students were already familiar with the platform ([Spicer et al., 2023](#)). Another benefit to students creating

materials within the classroom is that “having pre-made study materials that aligned with the course helped them focus their time on learning new content rather than searching for the best learning resources” ([Spicer et al., 2023, p. 1382](#)). Harris et al. ([2015](#)) describe the tension between the desire to provide students with more multiple choice questions within the curriculum and the lack of time and incentive faculty have to spearhead this. They go on to outline a student-led method of creating multiple choice questions for use in the medical school curriculum. Librarians can help facilitate and support such projects, adding skills in copyright and information literacy to the project team. While students are often familiar with platforms, such as Anki flashcards, faculty are not ([Spicer et al., 2023](#)). Librarians can help fill in this gap by learning platforms and offering technical assistance. This is especially true in libraries with an instructional design or education librarian on staff. While this will often not directly forward the OER movement because the digital study tools, such as flashcards, will most likely only be internally available, it does forward the library’s mission to move away from reliance on commercial, proprietary resources and provide equitable access to study materials. There is also the opportunity to suggest that some of these materials be shared as OER, with [MedEdPORTAL](#) as a discipline-specific example.

Create

At the high end of both the OER and library involvement continuum, libraries could attempt to create OER alternatives to popular digital study tools. While much work has been done to modernize health sciences curriculums, such as in medicine, students continue to engage in a “parallel, student driven curriculum” composed primarily of digital study tools ([Wu et al., 2021, para. 5](#)). Health sciences faculty who are active clinicians and researchers often do not have time or expertise to remake curriculum using self-directed learning and digital study tool best practices. Students are using digital study tools, and it is not a new phenomenon that they are creating their own study tools and may want to translate this into direct medical education experience ([Bow et al., 2013](#)). Due to librarians serving as a hub for the academic community with deep expertise in resources, evaluation, facilitation and copyright they can act as the missing piece to help students and faculty translate traditional curriculum into digital study tools. Kirschner et al. ([2023](#)) call for “growing library support” and note that because librarians are “already a trusted support system,” it is possible to “build on existing connections and expertise to educate about and advocate for faculty adoption of open educational practices” ([p. 12](#)).

A number of things would need to happen for libraries to serve in this role. Libraries would most likely need to acquire funding through a grant or large-scale collaboration to be able to create and maintain a true open alternative to popular digital study tools. While not unique to the health sciences, there is often a preference for developing a for-profit, commercial product instead of an open version ([Kirschner, et al., 2023](#)). This cultural preference might be a potential roadblock if a library decided to try to develop open digital study tools.

Conclusion

Any or all of the four approaches – assessing, adopting, adapting or creating – are appropriate if it meets your institution’s – and students’ – needs. It is important to know your stakeholders, whether that is the students themselves, or the faculty who teach them, or the administrators that make high-level decisions about education. For some libraries, using multiple approaches may be the best path to meeting user digital study tool needs. For example, your library may choose to adopt one commercial tool while pursuing opportunities to help adapt the curriculum to better reflect student preferences. Whatever approach your institution pursues, make sure your stakeholders know what open educational resources are, and how these compare to the paid subscription tools that students may finance out of their own pocket. Make sure your stakeholders know about library resources that are free to them and can help meet their study needs. Also, remember you will need to periodically assess your users and stay up to date with new technology, such as Generative AI, that has the potential to impact how students learn and study. Encourage faculty to incorporate their librarian into curriculum development or to partner with a librarian on student-created OER materials. Even when OER solutions to digital study tools are not currently available, OER promotion and education can be a first step any library can take to garner the support necessary to create an alternative.

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